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ABSTRACT

The Graduate Student Instructors (GSI) program developed at the University of Minnesota is described. The design and content of the teacher training seminars and the feedback procedures of test analysis, student evaluation of the GSI, and videotape critiquing are detailed. An evaluation is included of the effectiveness of the training program as well as a number of suggestions for implementing a similar program at another institution. In creating the GSI training program, the Center for Economic Education attempted to compensate for a deficiency in the training of graduate student instructors who, typically, are well educated in their respective fields but unschooled in teaching methods and skills. The success of the program depends upon whether it can improve the quality of GSI's interaction with students, increase the economic understanding acquired by those students, and improve the students. performance in society. Appendices to the monograph include a seminar syllabus outline, categorical references, and a selected bibliography. (LBH)

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CENTER FOR EDUCATIONAL DEVELOPMENT
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A training system for graduate student instructors of economics

U.S. DEPARTMENT OF HEALTH
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Foreword

The landscape of higher education literature relating to academic programs has two major prominences which share some common border segments but little common ground. One is the literature of educational research: strong on analysis, primarily written for and read by peers, fairly well organized but nearly inaccessible to educational practitioners. Another is the educational literature of the college or university instructor: strong on practicalities, also mainly written for and read by peers, but not well enough organized for ready access across disciplinary boundaries.

The Center for Educational Development, whose purpose is to encourage improvement of the educational programs of the University of Minnesota, works in the region between and around these prominences. Believing in the power of thoughtful and documented example, the Center edits and publishes monographs written by members of the faculty of the University of Minnesota which satisfy two criteria:

- *Monographs must describe and document the achievements of a specific development activity directed to the improvement of the educational program of the University.* The report must be of work which is applicable to other instructional areas and must provide sufficient detail to guide the planning of others considering a related development.
- *Monographs must provide a direct tie to the basic knowledge of the applied and theoretical social and behavioral sciences which relate to the development project.* We intend that the monograph serve both to inform and encourage the practitioner with knowledge of the intellectual base for the development *and* to stimulate ideas for future research in the social and behavioral sciences.

We would appreciate receiving your assessment of this monograph on either or both of these criteria and your suggestions of topics for future monographs in this series.

James H. Werntz, Jr., Director
Center for Educational Development

Additional copies of this monograph are available from the Center for Educational Development, 317 Walter Library, University of Minnesota, Minneapolis, Minn. 55455. Requests from outside the University of Minnesota should be accompanied by a check or money order for $1.50.

A Training System for Graduate Student Instructors of Economics

by
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1. Introduction

In 1970, in response to a request from the Graduate Economics Club and the Department of Economics, the Center for Economic Education at the University of Minnesota initiated a teacher training program for graduate students. The goal of the program has been to improve the pedagogical ability of new graduate student instructors (GSI's) who, as junior faculty in the economics department, teach the introductory courses in economics.[1] Since the program's inception, the staff of the Center for Economic Education has developed the program in two directions: creating a series of *weekly seminars* on teaching objectives, methods, and skills for the GSI; and creating *feedback procedures* using video-taping, test analysis, and student evaluations to aid the GSI in assessing the effectiveness of his or her teaching. Today the seminar and feedback procedures are complementary inputs to a total teacher training program in the economics department.[2]

This monograph describes the GSI training program developed at the University of Minnesota. It details the design and content of the teacher training seminars and the feedback procedures of test analysis, student evaluation of the GSI, and videotape critiquing. It includes an evaluation of the effectiveness of the training program and a number of suggestions for implementing a similar program at another institution.

In creating the GSI training program, the Center for Economic Education attempted to compensate for a deficiency in the training of graduate student instructors who, typically, are well educated in their respective fields but unschooled in teaching methods and skills. Although the economics department at the University of Minnesota has long made extensive use of graduate students in the teaching of undergraduate economics, prior to the inception of this teacher training program it required only that beginning graduate instructors be second-year economics graduate students and eligible for financial aid. The department assigned new GSI's to

[1]GSI's are responsible for planning and instruction for three of the four weekly class meetings of the principles courses in macroeconomics and microeconomics, and for other undergraduate courses. Senior faculty participate in the principles courses primarily as guest lecturers once a week. Class sizes average 45 for most of the introductory courses.

[2]While the content of the teacher training seminars would depend upon the needs and organization of each teaching institution, the seminars are an essential part of the program. The total time commitment of staff and GSI's is reduced by presenting both information and pedagogical abilities in group sessions (the seminars) rather than attempting to acquaint each GSI with all appropriate teaching techniques and methods during individualized videotape critique sessions.

either the micro or macro principles course; provided them with a text, instructor's manual and a sample syllabus; and pointed them in the direction of the classroom. In many cases, beginning GSI's had a far different perspective of the economics principles course than did their students. In addition, they had little opportunity to learn basic teaching methods or skills (except by the painful process of trial and error). Thus, the goal of the program described in this monograph has been to structure formally a training opportunity for GSI's to improve their pedagogical performance.

In designing the GSI training program, the program staff committed itself to the model of the educational process summarized in Table 1. Through seminars and feedback procedures, the program staff initiated interaction with GSI's designed to improve the pedagogical quality of GSI's interaction with their students. The program staff recognized, however, that pedagogical performance is merely theatrical if it does not lead to learning and/or changed behavior on the part of the students. As suggested by the educational process model, students will find the course to be of greater value and will be better motivated to learn economics if they can see how to apply basic economic concepts to their societal roles as consumers, producers, and citizens. Thus the success of the program depends upon whether it can improve the quality of GSI's interaction with students, increase the economic understanding acquired by those students, and, ultimately, improve the students' performance in society.

Table 1

Educational Process Model

Types of Interaction	Teacher Training Program • Seminars • Feedback system	Teaching/ learning principles of economics	Production Consumption Citizenship
Participants in Interaction	Staff ↔ GSI's	↔ Students	↔ Society
Measurable Objectives for Interaction	Improved GSI performance	Improved student understanding of economics	Improved performance of students in society

2. Describing the GSI Training Program

The GSI training program at the University of Minnesota involves two types of staff and GSI interaction, in seminar sessions and in feedback procedures. In the seminars, the staff provides the GSI's with opportunities for coordination, discussion, and the learning of teaching skills. In the feedback processes, the staff reinforces good teaching performance and provides the GSI's with opportunities to assess their performance from the student's point of view.

The staff directing the GSI program consists of a program director (senior faculty), a seminar coordinator (junior faculty) and a feedback reviewer/critiquer (junior faculty). The program director assumes responsibility for content of the seminars, assists in seminar presentations, and assures that feedback procedures reinforce good teaching and are coordinated with the seminars. The seminar coordinator, under the supervision of the senior faculty person, plans, coordinates, and schedules the nine 75-minute seminars. The seminar coordinator also oversees the administration and processing of student evaluations. The feedback/critiquer schedules three classroom videotapings for each GSI, reviews and codes the tapes, and critiques GSI teaching performances.

The Seminars

Nine weekly seminars are scheduled during the new GSI's first teaching quarter. Although consideration was given to conducting the teacher training program prior to the GSI's first teaching quarter, the staff concluded that program participants would take part more energetically when they faced current teaching responsibilities, and decided to relate the seminar topics and exercises as closely as possible to the problems and responsibilities the GSI faces in the classroom. Nevertheless, the seminar coordinator schedules the first seminar in advance of the first teaching day in order to deal with the anxiety a GSI will likely feel in facing a first teaching experience, to inform the GSI of departmental and university rules and the location of clerical, audiovisual, computer, library, and other support services, and to dis-

cuss future seminar topics. The seminar coordinator publishes in advance an agenda for each of the 75-minute sessions, clearly stating the objectives for the session.

The goal of the seminars is to improve the pedagogical performance of the GSI's. The program staff attempts to meet this goal by teaching the GSI's the basic teaching abilities described in Table 2.

In conducting the seminars, several strategies have been developed for teaching the stated objectives.

First, it has been found that the abilities divide themselves into four sequential clusters—objective setting and curriculum planning, lecture skills, tests and grading, and discussion and interaction skills.

Second, it has been found that it is crucial to have the GSI's undertake exercises in which they practice the teaching abilities and receive feedback from the seminar group. When possible, the seminar coordinator will link the exercise closely to the GSI's course activities. For example, the GSI's are assigned the task of writing some test items which are reviewed in the seminar. This exercise is scheduled so the GSI's may use the items for their midterm examinations.

Third, it has been found that GSI's strongly desire to use seminar time to share ideas about course content and strategies for introducing various topics to their students. A skillful seminar leader can channel this energy into concurrent discussion of the teaching abilities in Table 2. Otherwise, the seminars are likely to degenerate into "story swapping" sessions. For example, a participant may wish to share with the group his or her presentation of some topic (e.g., the aggregate investment-interest rate relationship). The seminar coordinator should require that the participant present appropriately constructed objectives, attempt to use good blackboard skills in the presentation, and agree to receive criticism not only on content but also on presentation skills.

Fourth, it has been found that microteaching[3] can be an effective method of reinforcing a teaching ability because it allows the GSI to try out new techniques in a situation which is less threatening than the classroom but which provides immediate feedback.

Fifth, it has been found that the last seminar session can best be used to solicit feedback from the GSI's on the conduct of the seminar program itself. The coordinator should ask whether or not (and why) the GSI's believe the goals of the training program and, in particular, the seminars were met. It is in conjunction with such feedback that the program staff may best plan needed program adjustments.

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[3]Microteaching is carried out by breaking the seminar into small groups, with each member giving a presentation using specific teaching methods. These presentations are often videotaped and immediately replayed for group evaluation (Allen and Ryan 1969).

In summary, a typical seminar session will begin with a restatement of the objectives for the session, will proceed with the presentation of some skills relevant to the abilities in Table 2, and will conclude with some exercise (or discussion) in which the participants have an opportunity to practice the skill and demonstrate their understanding of it.

As illustrated by the Seminar Syllabus in Appendix A, the seminars are devoted to such activities as writing goals for the principles course, writing individualized objectives, discussing and demonstrating lecture skills, demonstrating teaching techniques for various concepts, discussing and demonstrating the use of audiovisual materials, writing and grading examinations, evaluating student feedback, and developing student-teacher interaction and discussion techniques.

Relative to each of the topics and activities presented or developed in the seminar, a selected set of bibliographic references

Table 2

Teaching Abilities and Feedback

Teaching Abilities Emphasized	Method of Feedback
Recognize student needs	Student evaluations
Set goals and write objectives	Daily teaching checklist
Develop content sequencing	Student evaluations, videotaping, teaching checklist
Use lecture skills effectively	Student evaluations and videotaping
Implement discussion skills effectively	Student evaluations and videotaping
Demonstrate interpersonal communication skills	Student evaluations and videotaping
Implement probing, questioning skills effectively	Student evaluations and videotaping
Utilize multimedia materials effectively	Student evaluations and videotaping
Construct and use well-made testing instruments	Student evaluations and test item response
Articulate problems, strengths in one's own teaching style	Student evaluations and videotaping
Establish grading guidelines	Student evaluations

is identified for the GSI participants. These references, listed by category in Appendix B, come from both the economic education literature and educational literature at large. In many instances, each GSI is provided with a copy of the article, chapter or monograph.

Some additional observations concerning the use and conduct of the seminars are also relevant. First, although it is not the primary purpose of the program, the seminar coordinator may find it natural to use the seminars as a vehicle for presenting the departmental curriculum plan, if one exists. Second, the seminar coordinator should give key senior departmental faculty the opportunity to join the GSI group to state their support of the program and their expectations of the participants. Third, program leaders should develop the attitude that the ideas and comments of each GSI participant are important and of potential value to the group.

The Feedback System

The duality between the *abilities* presented and practiced in the seminars and the *feedback* to the GSI on the performance of these abilities in the classroom (Table 2) is suggested by the "Systems Model for Educational Planning and Instruction" presented in Table 3.

The systems model of Table 3 represents the organizing principle used in the design and execution of the GSI training program. In particular, it suggests an emphasis on providing the GSI with a variety of types of feedback not only on his or her performance of each teaching skill but also on several of the teaching abilities themselves. The systems model proposes that the educational process begins with a recognition of students' needs and proceeds to a circular process of (1) goal setting for the course as a whole, (2) objective setting for each course meeting, (3) planning each course meeting, (4) conducting the course session according to one's plans, (5) receiving via several feedback sources data about one's performance in the course, and (6) evaluating and revising the goals, objectives, planning, and implementation (and perhaps one's assessment of student needs) in the light of the feedback data.

In the GSI training program, the feedback process is designed to reinforce the teaching principles and skills presented to the GSI in the seminars and to give the GSI an opportunity to analyze systematically his or her own teaching performance from the stu-

dent's point of view. The feedback system is composed of three primary parts: test analysis aimed at evaluating teaching, student evaluations of the instructor via the Purdue Rating Scale for College Instructors, and a videotape observation program. The purpose of the next three sections is to describe this test analysis, explain how the Purdue Rating Scale is used, and detail what is involved in a videotaped episode by analyzing its four component parts: pretaping, taping, reviewing, and critiquing.

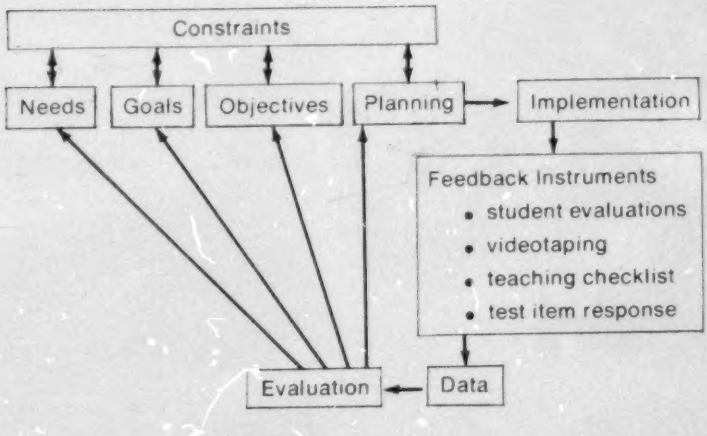
Test Analysis

As has already been noted, the GSI receives instruction in tests and measurements (Gronlund, 1971, pp. 129-260) during the seminar sequence of the program. This training is designed not only to assist the GSI in assessing student achievement for grading purposes, but also to assist in assessing his or her own performance in teaching.

The GSI is taught that construction of a classroom test must be preceded by 1) specification of objectives and student learning applications, 2) an outline of subject matter content, 3) preparation of individual test items which are in line with objectives and

Table 3

Systems Model for Educational Planning and Instruction[4]



[4]Adapted from the systems model presented by Kenneth Majers at Indiana University, JCEE/AEA Teacher Training Workshop, Summer 1973.

content, and 4) a Table of Specification which distinguishes possible test questions on the basis of subject matter content and objectives. As illustrated by Table 4, a Table of Specification lists the subject content topics across the top of the table and objectives down the side. The cells of the table can be weighted in accordance with the importance given to each question within the

Table 4

Table of Specification

Content grouping / Level of application	First subject content area	Second subject content area		Jth subject content area	Application distribution
Definition	a_{11}	a_{12}		a_{1J}	$\sum_{j=1}^{J} a_{1j}/N$
Recognition	a_{21}	a_{22}		a_{2J}	$\sum_{j=1}^{J} a_{2j}/N$
Simple application	a_{31}	a_{32}		a_{3J}	$\sum_{j=1}^{J} a_{3j}/N$
Complex application	a_{41}	a_{42}		a_{4J}	$\sum_{j=1}^{J} a_{4j}/N$
Content distribution	$\sum_{i=1}^{4} a_{i1}/N$	$\sum_{i=1}^{4} a_{i2}/N$		$\sum_{i=1}^{4} a_{iJ}/N$	1

N = Total number of questions

a_{ij} = Number of questions in ith application and jth content category

J = Total number of subject content areas

cell, or, in the case of a multiple choice test, by the number of questions which fall into each cell. These weights are represented in Table 4 as the a_{ij}'s.

For evaluating their own teaching effectiveness, as opposed to evaluating student achievement, GSI's are encouraged to use multiple choice tests. In contrast with matching, essay, or true-false tests, multiple choice tests have the advantages of structuring responses and being most amenable to diagnosis. To obtain student feedback on teaching via multiple choice test item responses, the instructor using self-made classroom tests can use a variant of discriminant analysis. Standardized or cumulative test score norms can also be used to assess teaching effectiveness.

In the case of self-made classroom tests, individual test question discriminant analysis is performed by computing a number which is called the test item discrimination coefficient, d. This computation can be done by subtracting the number of students who received total test scores in the lowest third, L, but got the item right, r_L, from the number of students in the upper third, U, who also got this item right, r_U. This difference is then divided by one-half the number of students in both groups, $\frac{1}{2}(L+U)$, i.e.,

$$d = \frac{r_U - r_L}{\frac{1}{2}(U+L)}$$

Maximum discriminating power would of course occur where $d = 1.0$. This indicates that the test item perfectly differentiated students in accordance with their overall achievement. A zero indicates no discrimination. Individual test item discrimination coefficients are typically used to decide which questions in a test are good segregators of students (Isaac and Michael 1971, p. 50). However, they can also provide the instructor with a basis on which to assess teaching effectiveness in terms of content coverage and student ability to apply concepts learned.

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After computing a discrimination coefficient for each test question, the instructor can gain information on his or her teaching effectiveness by computing the average discrimination power of all questions in a cell—that is, the average discrimination coefficient for all questions in the ith application and jth content category of the Table of Specification. Similarly, the instructor can compute the average discrimination coefficient for all questions in the content columns of the Table of Specification—that is, the average discrimination coefficient for all questions in the jth content category.

Although the discrimination power of any given test question falling into one of the Table of Specification cells may be poor, it

is unlikely that all questions in a cell will be low due to ambiguity, lack of quality, or poor specification. It is even less likely that all questions in an entire content column will be low because of poor test item construction. Therefore, if the *average* discrimination power of all questions in a cell is low, the instructor may have reason to suspect that he or she did not do a good job of teaching the specific content to bring forth the given level of student application. A low *average* discrimination coefficient for a content column may indicate that the entire subject content area was poorly taught. By filling out the entire Table of Specification in terms of *average* cell discrimination coefficients, the instructor has a base upon which to assess his or her areas of ineffective teaching.

Besides using classroom tests to assess teaching effectiveness, the instructor can evaluate teaching output in terms of his or her past students' performance, colleagues' students' performance, and nationally normed student performance (Eble 1962). This type of assessment, however, requires the use of standardized testing instruments and procedures which must remain unchanged over time and between instructors. It also requires detailed knowledge of the norm or comparison group characteristics. An instructor cannot assess his or her relative teaching effectiveness without knowing how his or her students compare to the norm group in terms of such things as sex, age, socioeconomic background, reading efficiency, or mathematic aptitude. Furthermore, an instructor cannot assess teaching effectiveness relative to the norm group without knowing the kind and amount of instruction given a content category by the norm group instructor (Isaac and Michaels 1971, p. 79). In most cases such detailed information is not available. Nevertheless, if the instructor is going to use norm group comparisons to evaluate his or her teaching effectiveness, that instructor must make an attempt to establish a comparison group which is similar to his or her student body.

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There are several methods an instructor can use to compare current teaching performance with past performance or with that of another instructor. First, the instructor can compare current students' final test scores with scores obtained on the same test by past students or a colleague's students. If the comparison group has characteristics similar to the instructor's current class, and if the instructor's current class has lower average scores on the entire final test, or in a sub-part of the test, then the instructor has grounds to question his or her teaching effectiveness.

Alternatively, the instructor can compare the change in beginning-of-the-course test scores and final test scores for his or her class with pre- and post-test changes recorded for other like groups of students. The students making up the norm group can consist of either the instructor's past students or some other in-

structor's students. It must be noted, however, that the use of this change comparison requires that the pre- and post-tests are measuring the same knowledge base and that the comparison group is similar in characteristics to that of the instructor.[5] If such is the case then any difference between the changes recorded in the norm group and the instructor's group can be attributed to teaching effectiveness.

Student Evaluations

The Purdue Rating Scale for College Instructors, shown as Table 5, is a well established teaching evaluation questionnaire with twenty-eight items for student responses. Each question is associated with one of five separable clusters representing the instructor's (1) personal characteristics, (2) objectivity, (3) exposition skills, (4) tests and grading, and (5) subject matter knowledge. The questions are posed in such a fashion as to give implicit description for appropriate corrective action. The questionnaire itself has been normed and assessed in terms of validity and reliability by the Purdue University Measurement and Research Center.[6]

Experience has shown that the GSI must be encouraged in the weekly seminars to administer the Purdue form before the end of his or her course, in order to make appropriate adjustments to benefit the class. At Minnesota the rating forms are provided and machine processed by the seminar coordinator. The print-out given back to the individual GSI includes:

(1) mean numerical student rating on each question;
(2) mean numerical student rating for each of the five clusters;
(3) cluster average and cluster range based on all accumulated data.

[5]The Test of Understanding in College Economics is a nationally normed pre- and post-test which measures like content categories in both micro- and macroeconomics (Buckles and Welsh 1972; Fels 1967, 1970; Lewis and Dahl 1971; Psychological Corporation 1968; Welsh and Fels 1969).

[6]An extensive body of literature has recently emerged within the field of educational research concluding that "appropriately constructed" student ratings can provide valid and reliable information on instructional quality (Costin, Greenough, and Menges 1971; Cohen and Berger 1970). Considerable discussion and use of student evaluations have also taken place within economic education (Capozza 1973; Hansen and Kelley 1973; Kelley 1972; Lumsden 1973; Mirus 1973; Nichols and Soper 1972; Saunders 1972; Soper 1974; Villard 1973). For an historical discussion of the use and development of the Purdue Rating Scale see Miller (1972) and Remmers and Weisbrod (1965).

Table 5

Rating Scale for College Instructors

This questionnaire contains 28 statements about your instructor. For each of these statements, you are to indicate how well the instructor of this course does the thing described.

Mark your rating in the space provided at the end of each statement on the following basis:

A—Superior	C—Above Average	E—Below Average
B—Excellent	D—Average	F—Poor

(Remember—these are your ratings of your instructor for this course.)

1. Grades are assessments of the student's knowledge, rather than an arbitrary system ____
2. Patient and understanding ____
3. Willing to help individuals outside of class ____
4. Uses tests and grades to help students find their strengths and weaknesses ____
5. Knowledge extends beyond his/her own field of specialization ____
6. Has a sense of humor ____
7. Willing to admit mistakes or lack of knowledge ____
8. Knows the subject well enough to evaluate controversial or obscure points ____
9. Grades are an accurate reflection of standing in the class ____
10. Willing to listen to and talk about divergent ideas or viewpoints that oppose his/her own ____
11. Gets the material across to the students (communicates) ____
12. Confident about his mastery of the subject (knows that he knows what he is talking about) ____
13. Presentation is concise—does not use too many words or repeat unnecessarily ____
14. Stays with a difficult topic until sure that the students understand ____
15. Maintains an atmosphere that encourages participation by students ____

It is important to note that the results of student ratings must be treated as confidential. Any open discussion or circulation of an individual's rating results must be left to the initiative of the individual.

The GSI is encouraged, however, to discuss and evaluate rating results with either the seminar coordinator or the feedback reviewer/critiquer. These staff members assist the GSI in spotting pedagogical problem areas and suggest corrective measures.

Videotape Observations[7]

The direct observation part of the feedback process requires the use of videotaping equipment. At the University of Minnesota a Sony AV-3600 recorder and AVR-TVC93A camera are used. This

[7]This section is adapted from a chapter entitled "The Use of Video Tape Analysis in the Graduate Student Instructor Training Program at the University of Minnesota" in a forthcoming Joint Council on Economic Education/American Economic Association book entitled *Teacher Training Programs for Ph.D.'s in Economics*.

Table 5 (cont'd)

16. Gives fair tests—appropriate point values, no trick questions, etc. ____
17. Is able to get along with people ____
18. Demonstrates formal (textbook) knowledge of the subject ____
19. Accepts criticisms or suggestions from the students ____
20. Assigns grades in such a way that the grade has some meaning for the student ____
21. Friendly toward students ____
22. Adapts to class' level of vocabulary and understanding ____
23. Willing to answer questions or accept interruptions during class ____
24. Knows more about the subject than just a collection of facts ____
25. Respects students' knowledge and opinions ____
26. Knows the answer to students' questions about the subject ____
27. Assigns grades impartially ____
28. My overall rating of this instructor is: ____

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Table 6

Daily Teaching Checklist

Date _____

Instructions: The purpose of this instrument is two-fold. First, it is designed to help you apply the *objective-setting approach* to each class session, and is, consequently, an essential part of each class preparation. Second, cumulatively the checklists should give you a perspective on your teaching progress through the course, thus helping you in goal-setting and preparation for reteaching the course.

At the Beginning of Session Preparation

1. What are the objectives for the session?

2. How are you planning to divide the class session?

____% time on review
____% time on today's objective(s)
____% time on summary and preview
____% time for knowledge of facts
____% time for theoretical concepts
____% time for exposition on theory
____% time for application of theory
____% specify: _____

16

3. What is your teaching plan?

____% time you will spend lecturing
____% time you will spend discussing student-initiated questions
____% time you will spend discussing instructor-initiated questions
____% time you will spend on other activities
Specify (and describe any experiment or new technique you intend to try): _____

After Teaching the Session

1. Did you meet your objectives? Why or why not?

2. How well did your teaching plan work? Comments which may be helpful for you to recall later:

equipment is simple to operate and easy to set up and take down. After an hour of instruction and a few supervised tapings any responsible university student is capable of taping an instructor in the classroom. To get consistent results from the taping, however, it is not sufficient that the taper know only how to operate the equipment. She or he must also follow a taping procedure checklist. A checklist of things to do while taping typically includes the following:

(1) Set up equipment before the class starts;
(2) Make sure equipment is operating properly;
(3) Videotape everything written on the chalk board or overhead projector *in closeup*;
(4) Try to pick up anything unusual in the classroom;
(5) Get the students on camera when they speak; and
(6) Follow the instructor at all other times.

At Minnesota an undergraduate does all the actual taping while a junior faculty member does the reviewing and critiquing. The issue of whether the reviewer/critiquer should also do the taping is an open one. A reviewer/critiquer who tapes the class will observe the class first hand. On the other hand, the taping quality is sometimes better if the taper is solely concerned with following the outlined procedure.

The basic problem involved in *arranging for classroom taping* is one of coordination. The GSI must be notified in advance in order to be able to explain to the class what will transpire on the day of taping. If the students are not informed in advance, staff experience has shown that the presence of the camera and equipment will disturb them. This is true even though the video equipment is quiet and requires no extra lighting.

Picking a time to tape the class is not always easy. The chosen time must be satisfactory to both the person doing the taping and the instructor. The reviewer/critiquer should have some time available shortly thereafter; it is usually best to review and critique as soon after the taping as possible. It is also necessary to make sure that the class activity is appropriate—e.g., an exam time is not appropriate. Finally, before taping begins the instructor should have filled out the Daily Teaching Checklist shown in Table 6. This form simply requires the GSI to state, in an objective-setting approach, what will be taught and how it will be taught on the day of taping. As will be shown, this form provides valuable information for the reviewer/critiquer as well as for the instructor being taped.

It is worth noting that the reviewer/critiquer can reduce coordination problems by attending the weekly seminars. Since all GSI's are required to participate in the seminars, videotaping schedules can be arranged prior to or just after the seminar sessions.

Table 7

Videotape Review Coding

Instructor _____ Class: Econ. _____ Section _____ Tape No. 1 2 3

METHOD	LEARNING OBJECTIVES	EXPRESSIONS	
		Verbal	Nonverbal
(4) Discussion (Student Initiated)	(5) Complex Application	(5) Supportive	(5)
(3) Questions/Problems (from Instructor)	(4) Simple Application	(4) Receptive	(4)
(2) Lecture	(3) Exposition on Theory	(3) Neutral	(3)
(1) Other	(2) Theoretical Concepts	(2) Unreceptive	(2)
	(1) Knowledge of Facts	(1) Disapproving	(1)

#	Method	Objective	Expressions Verbal	Expressions Nonverbal	#	Method	Objective	Expressions Verbal	Expressions Nonverbal
001					034				
002					035				
003					036				
100					136				
101					137				
102					138				

Reviewing classroom performance

Reviewing consists of three separate procedures: coding, filling out the Summary Checklist, and preparing the critique.

Coding. The coding process requires the specially developed Videotape Review Coding form shown in Table 7 and a device which will deliver beeps at 20-second intervals. On hearing the beep, the reviewer/critiquer records on the coding form what is going on at that moment in the classroom. After doing this for the entire tape, one has a time series index of what methods were used, what type of learning was taking place, and what verbal and non-verbal expressions the instructor projected. This information serves two purposes. First, it is valuable information for the reviewer/critiquer to have for subsequent discussion. Second, it provides the instructor with a measure of what he or she did in the classroom to compare with what he or she planned, as recorded on the Daily Teaching Checklist which the instructor filled out before the taping. For example, an instructor who planned to lecture 25 percent of the time might not realize he or she actually lectured 75 percent of the time, until convinced by the coding data.

The reviewer's coding form currently used at Minnesota is an observation instrument specially adapted for this project. It is used by the reviewer/critiquer to get a judgmental measure of (a) the method employed by the instructor (discussion, questions/problems, lecture, other), (b) the learning objectives (complex application, simple application, exposition on theory, theoretical concepts, knowledge of facts), and (c) and (d) the verbal and non-verbal expressions (supportive, receptive, neutral, unreceptive, or disapproving).

The following operational definitions are used in coding:

a) Method

Discussion—If during the interval of observation the critiquer observes the teacher primarily listening to a student-initiated point or question and briefly responding to it, it is recorded as discussion (4).

Questions/Problems—If during the interval of observation the critiquer observes the teacher primarily asking questions to which he or she expects an immediate student response, it is recorded as questioning (3).

Lecture—If during the interval of observation the critiquer observes the teacher primarily "talking at" the student, it is recorded as lecturing (2).

Other—If during the observation period the critiquer observes the teacher doing such things as reading directly out of the text or watching a film with the class, the critiquer records "other" (1).

b) Learning Objectives

Complex application—The discussion, lecture, or questioning observed pertains to utilizing more than one economics principle or concept in analyzing a real world problem (5).

Simple application—The discussion, lecture, or questioning observed pertains to using a single economics principle or concept in analyzing real world or hypothetical problems (4).

Exposition on theory—The discussion, lecture, or questioning observed pertains to proofs, intuitive explanations, or analysis, of economic theory (3).

Theoretical concepts—The discussion, lecture, or questioning observed pertains to introducing and defining economic concepts such as comparative advantage, opportunity cost, or law of demand (2).

Knowledge of facts—The discussion, lecture, or questioning observed only pertains to institutional descriptions, dates, names, and the like (1).

c) Verbal Expressions

Supportive/Receptive—If in the process of lecturing, discussing, or questioning the instructor keeps students on task or reinforces student activity by positive verbal comments or by changing tone of voice, speed of talking, or diction, the instructor is recorded as being receptive. For example, while lecturing the instructor slows down to give students ample opportunity to take specific notes; while questioning students the instructor, through probing techniques, leads the students to the correct answer and then congratulates them for critical thinking. Receptive (5) or highly receptive (4) is used to indicate the degree of support expressed.

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Neutral—The instructor is not observed to be changing speech patterns or verbal comments in any way which would tend either to support student activity or to belittle students (3).

Unreceptive/Disapproving—If in the process of lecturing, discussing, or questioning the instructor makes verbal comments which tend to belittle students or show disapproval for students' comments, the instructor is recorded as unreceptive (2) or highly unreceptive (1).

d) Non-Verbal Expression

Supportive/Receptive—If in the process of lecturing, discussing, or questioning the instructor attempts to keep students on task or to reinforce student behavior and comments by using changes in physical position or facial expressions, then he or she is recorded as being receptive. For example, while lecturing about a graph on the chalk board the instructor walks toward the

board and points to the appropriate points on the graph; while students are discussing a given problem the instructor nods and smiles in agreement; while asking a question the instructor takes a step toward the student. Once again highly receptive (5) and receptive (4) are used to indicate degree of supportive instructor action.

Neutral—The instructor does not demonstrate any physical movement or facial expression which would tend to be supportive or discouraging to students (3).

Unreceptive/Disapproving—If in the process of lecturing, discussing, or questioning the instructor uses physical gestures, movements or facial expressions which tend to demonstrate lack of concern for students, or disapproval of a student's comment, the instructor is recorded as unreceptive (2) or highly unreceptive (1).

The coding form is segmented vertically by 20-second time intervals sequentially labeled 001, 002, 003, and so on, to 138. Upon receiving a 20-second beep, the reviewer records what the GSI is teaching. For instance, on the 34th beep (11 min. 20 sec. after the start of class on the videotape) assume the reviewer observes the GSI initiating questions based on a real world problem which involves using one economic principle to obtain a solution. In posing the question the GSI implies that even the "dumbest" student in class should know the answer. Assume also that the reviewer observes the GSI turn and face away from the student in posing the question. Using the operational definitions given above, the reviewer would record such an observation as follows:

	Method	Objective	Expressions	
			Verbal	Nonverbal
034	3	4	1	1
035				
036				

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The 3 under Method indicates that the instructor initiated the question or problem. The 4 for Objective indicates that the instructor is looking for a simple application of theory. Under the heading Expressions the two 1 s reflect the fact that the instructor gave both nonverbal and verbal signs of strong disapproval and unreceptiveness to the students.[8]

[8]A videotape demonstrating these alternative teaching methods, objectives, and expressions has been developed by members of the project and the Center staff (Salemi and Becker 1974).

Table 8

Summary Checklist for Videotape Reviewing

I. *Summary of Videotape Review Coding Data*

Score	Method	Learning Objective	Verbal Expression	Nonverbal Expression
5				
4				
3				
2				
1				

II. *Exposition Skills and Physical Characteristics*

1. Eye Contact
2. Mannerisms
3. Voice (pitch, rate, volume, articulation)
4. Delivery in general
5. Use of blackboard (neatness, wise use of space)

III. *Student-Instructor Interaction*

1. Question techniques (open, closed, directed, reversed, relayed, rhetorical, thought-provoking, pause for answers, clear, preconceived)
2. Attitude projected (positive, negative or indifferent)
3. Motivation of the students

After reviewing the entire tape, the reviewer simply calculates the percentage of time the GSI spent in using different methods, objectives, and expressions.

Summary Checklist. Filling out the Summary Checklist for videotape reviewing is a less formal and more subjective procedure than coding. As shown in Table 8, the Summary Checklist is divided into four categories—i.e., summary of videotape review coding data, exposition skills and physical characteristics, student-instructor interaction, and organization and objectives. As one goes down the checklist the categories become increasingly more subtle and difficult to correct. If it is an instructor's first taping episode, the reviewer/critiquer and the instructor should probably concentrate on Category I; by the third taping, they will have dealt with Category II and III problems and they can concentrate on Category IV. The Summary Checklist actually has two purposes: first, it provides important data for preparing the critique, and second, a copy of the checklist can be given to the instructor for reference after the critiquing session.

Preparing the critique. To prepare the critiquing session the reviewer/critiquer must first schedule a time when the GSI is free for at least two hours. Then all the data must be collected and synthesized—i.e., coding forms, Summary Checklist, GSI's Daily Teaching Checklist, student evaluations (if available), any data from previous tapings, and the tape itself. Using all this information the reviewer/critiquer must set objectives for the critique. These objectives will depend on the instructor and how many times that instructor has been taped. A list should be made of all the points to be made as well as when to stop the tape. At this point the critiquer is prepared.

Table 8 (cont'd)

IV. *Organization and Objectives*

1. General structure of class
   (Introduction: provide reference for starting points;
   Sub-parts: summarized and referred to outline;
   Ending: summarized and projected to the next session)

2. Did the instructor meet the objectives he or she set?

3. Are the objectives of the class session consistent with the course goals?

Handling the critique

How a critique is actually conducted depends on the reviewer/critiquer and the instructor. It is a very subjective process and no formula exists for a successful critique. Following is a list of suggested principles which have proven helpful at Minnesota:

- The reviewer/critiquer should try to establish a friendly, relaxed atmosphere.
- The reviewer/critiquer should be non-judgmental. The purpose is to improve instructors, not judge them.
- The reviewer/critiquer's role is to make suggestions to the instructor, which may be adopted or disregarded.
- The reviewer/critiquer should not try to change an instructor's style but instead work on improving that instructor's techniques and skills.
- The reviewer/critiquer should follow good communication principles during the critique. It is quite unconvincing to explain to an instructor that eye contact is important while you stare at the ceiling.
- The reviewer/critiquer should take personalities into account. Some people are more defensive than others, and the critiquer must be ready to adjust remarks accordingly.
- The reviewer/critiquer should provide the instructor with motivation.
- The instructor should be encouraged to try to see himself or herself as the students do. Many valuable insights are obtained this way.
- The reviewer/critiquer should make clear from the beginning what is expected from the instructor. Before the first critiquing the instructor must be notified that the Daily Checklist must be completed prior to the videotaping.
- The reviewer/critiquer should make sure that there is an agreement as to what the GSI will work on and make a note of this for the next taping session.
- The reviewer/critiquer should not try to do too much in one session; a critique of a one-hour class should be kept to about two or two-and-one-half hours.
- Experience at Minnesota has indicated that at least three full videotaping episodes are necessary for most of the inexperienced GSI's in the program.
- The reviewer/critiquer should attend the GSI seminars. Teaching skills learned in the seminars can be discussed and reinforced during the critique.
- The videotaping and feedback process should be completely confidential. The instructor should have complete control over who sees his or her tape.

3. Evaluating the Effectiveness of the GSI Training Program

This section reports on the results of an evaluation of the effectiveness of the GSI training program at the University of Minnesota.[9]

Throughout the first year in the development of the GSI training program, 1970-71, both participation and feedback from the GSI's had been excellent. However, a basic question remained: Were we having any measurable impact on student and instructor performance in the actual classroom? To resolve this question, the following study was conducted.

Experimental Design

During the 1971 fall quarter, all students enrolled in Economics 1-001 (Principles of Economics—Macroeconomics) were selected as a control population. Students in the course met once a week for a mass lecture, and were divided into fourteen sections which met as sections three times each week. Average section size was 25. Student enrollment in each section was essentially a self-selection process on a first-come, first-served basis. Sections were offered at various times between 8:00 a.m. and 4:00 p.m., Monday through Friday, with no instructors identified in class listings. The mass lecture was handled by senior faculty in the department while the fourteen sections were conducted by seven graduate student instructors, each teaching two sections.

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During the fall quarter, the seven GSI's of Economics 1-001 were precluded from participating in or having knowledge about the videotaping, seminars, or any other facet of the training system described in this monograph. Similarly, these seven instruc-

[9]The evaluation design and results of the study reported in this section have been adapted from an earlier article published by D. R. Lewis and C. C. Orvis (1973).

tors and their students were unaware of both the experimental design and the hypotheses being tested. However, all of the Economics 1-001 students in the fall term responded to survey questionnaires dealing with student characteristics and were pre- and post-tested on the Test of Understanding in College Economics (Part I, Forms A and B).[10] Post-course student evaluations of each instructor's performance were also collected on the Purdue Rating Scale for College Instructors.

In order to control for the experimental training of instructors, the same seven GSI's were used as the experimental group during the winter quarter when Economics 1-001 was again offered. The experimental group of 438 winter quarter students was again divided into fourteen sections with an average section size of 31. As with the control students, all the winter quarter experimental students responded to the survey questionnaire, the Purdue Rating Scale, and the TUCE. Subsequent tests on selected student characteristics and Pre-TUCE scores revealed no significant differences between the control and experimental groups (see Table 9 and the study results below). All sections and instructors in both the fall and winter quarters used the same instructional materials and departmental course syllabus, and the same senior faculty gave the mass lectures.

The experiment was designed such that the seven instructors were randomly selected from a total of 22 GSI's in the fall of 1971. The seven instructors were then given only a syllabus and section assignments and were not provided with any other assistance or training. However, during the winter quarter these same seven GSI's were systematically exposed to the GSI training system described in this monograph.[11]

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[10]The Test of Understanding in College Economics (TUCE) is a nationally normed and validated test designed to measure student performance in the introductory economics course. Based on recommendations of the American Economic Association's Committee on Economic Education, it was published by the Psychological Corporation (1968).

[11]Although most of the GSI's in this experimental study had teaching experience prior to their participation in the project, a weakness in the design of the study is the possibility that any superior performance in the winter quarter may be attributed to their maturation and/or additional experience. However, similar data on student and GSI performance from an earlier study with the introductory course at the University of Minnesota indicated that the additional experience of only one term is not significant (Lewis and Dahl 1972). In fact, the obverse was true in the current study. The GSI who had the most previous teaching experience was the GSI in the fall term with the lowest student and instructor performance and subsequently showed the most improvement as a result of the training system. On the other hand, the two GSI's with the least teaching experience were among the top three in student and instructor performance during the fall term.

Description of Experimental Results

As Table 9 indicates, the winter quarter experimental group of students did not differ significantly from the fall quarter control group in any of five matching variables—i.e., Sex, Age, Cumulative Grade Point Average, ACT Score, and Pre-TUCE—at the two-tailed .05 criterion level employed in the study. Consequently, with the same instructors teaching in both the fall and winter quarters, the groups were considered adequately matched for purposes of the evaluation study.

The Pre-TUCE data in Table 9 also indicate that the Minnesota scores for both the experimental and control groups approximate the national norm of 13.24 at the outset of each quarter term. Post-TUCE scores for the fall quarter control group also approximate the national norm of 19.08, further indicating normality for the control sections (Psychological Corporation 1968).

Impact of the Training System on Student Learning

As Table 9 indicates, the winter quarter experimental students clearly outperformed the control students in economic understanding. Not only were the differences between group Post-TUCE scores significant, but the Change-in-TUCE scores (Post-TUCE minus Pre-TUCE) also indicated significant differences. The experimental group exhibited a 54 percent gain over their Pre-TUCE score while the control group experienced only a 43 percent gain in output added.[12] The gains for the control group are comparable to the national norming data for the TUCE wherein students from four-year colleges showed average gains of 40.3 percent. The experimental group's performance was clearly superior.

Although the significance of the training system's impact on student learning is clearly evident from the above data and discussion, a more controlled analysis of the data was performed by

[12]Any discussion of output added on the TUCE must be qualified with the recognition that the output added function is clearly non-linear; there are easy questions, questions of medium difficulty, and some which are very difficult. In fact, the test was designed this way in terms of cognitive composition. It is therefore somewhat inappropriate to compare increments on this test, as constructed. For example, at the extreme a student moving his or her total score from 3 to 6 on the TUCE has picked up much less economics than a student moving from 28 to 31. Only on a truly linear test can these types of comparisons be safely made.

Table 9

Description of Student Characteristics, Performances, and Evaluations: Fall and Winter Quarters

Variables	Fall Quarter N = 323 14 Sections		Winter Qtr. N = 438 14 Sections		t-test Comparing Means
	Means	S.D.	Means	S.D.	
Sex (0, 1) Male = 1	.71	.45	.70	.46	.30
Age (17-38)	20.49	3.09	20.80	2.74	1.43
Grade Point Average (0-4)	2.73	.51	2.77	.48	1.09
ACT Score (0-36)	24.88	3.18	24.46	3.63	1.50
Pre-TUCE (0-33)	13.52	3.70	13.04	3.96	1.71
Post-TUCE (0-33)	19.46	4.70	20.11	4.53	1.97*
Change-in-TUCE	5.94	4.52	7.07	4.67	3.36**
Average Instructor Rating (1-6), 1 = Very Low	4.11	.84	4.46	.78	5.68**
Rating Scale Sub-parts:					
1) Personal Evaluation (1-6), 1 = Very Low	4.41	.90	4.76	.85	5.42**
2) Objectivity Evaluation (1-6), 1 = Very Low	4.32	.91	4.70	.86	5.82**
3) Exposition Evaluation (1-6), 1 = Very Low	3.82	1.10	4.32	.99	6.45**
4) Testing Evaluation (1-6), 1 = Very Low	3.89	.95	4.10	.92	3.05**
5) Knowledge Evaluation (1-6), 1 = Very Low	4.26	.93	4.52	.81	4.02**

* Significant at the .05 level

** Significant at the .01 level

fitting the student descriptors, evaluations, and test results to a multiple linear regression model.

When this was done, the significance of the earlier t-statistics was confirmed.[13] While controlling for prior knowledge in economics, mental ability and achievement, maturation, sex, and student evaluations of the instructor, the type of class with experimental involvement in the project did have a significant association with the students' Post-TUCE scores.[14] The model predicts that a student attending a class which was involved with the GSI training system would, on the average, score almost three-quarters of one point (.71) more than non-participants on their Post-TUCE scores.

The regression model also indicates that the six other variables significantly associate with student achievement in economic understanding. Prior knowledge in economics, mental ability and achievement, maturation, sex, and student evaluations of the instructor were all found to be significant. These findings are all consistent with the results of other research in this field (Bach and Saunders 1965; Bellico 1970; Capozza 1973; Gery 1970, 1972; Lee, Kelley, and Weisbrod 1970; Lewis and Dahl 1972; Lewis and Orvis 1971; Paden and Moyer 1969, 1972; Saunders 1970, 1971, 1972; Sloane 1972; Weidenaar 1972; Welsh 1972).

Impact of the Training System on Instructor Performances

The data in Table 9 and Table 10 also confirm that the GSI training system had measurable and significant influences on the instructors' actual performances as measured by student evaluations. Not only was there a significant difference between quarters in the total Rating Scale for all of the instructors, but each of the sub-parts to the Rating Scale was also significantly different between the experimental and control groups. In turn, these changes in GSI performance associated significantly with student learning, as confirmed in the regression model by the association of the instructor evaluation variable with Post-TUCE scores.

It is important to note that throughout the experimental quarter's videotaping review sessions the instructors were presented

[13]Regression coefficients and tests of significance can be found in Lewis and Orvis, *op cit.*

[14]All variables in this model were found to have inter-correlations of .21 or less in the correlation matrix except ACT and Pre-TUCE. They had a correlation of .31, a degree of inter-correlation not detrimental to the model's analysis since they were both significantly correlated with Post-TUCE.

Table 10

Student Ratings of Instructors

Sub-Parts	Range	Average: All Instructors	Individual Instructors I	II	III	IV	V	VI	VII
Personal Characteristics	Fall 3.90-4.97	4.39	3.90	4.97	4.09	4.89	4.65	4.18	4.03
(Questions 2-3-6-17-21-25)	Wtr 4.33-5.41	4.74	4.33	5.41	4.55	4.54	4.78	4.69	4.86
Change from Fall to Winter		.35	.43	.44	.46	(.35)	.13	.51	.83
Objectivity	Fall 3.90-4.91	4.30	3.98	4.91	4.19	4.59	4.60	3.95	3.90
(Questions 7-10-19-23)	Wtr. 4.26-5.26	4.68	4.46	5.26	4.56	4.26	4.80	4.59	4.83
Change from Fall to Winter		.38	.48	.35	.37	(.33)	.20	.64	.93
Exposition	Fall 2.86-4.59	3.78	3.47	4.59	3.70	4.49	4.12	3.20	2.86
(Questions 11-13-14-15-22)	Wtr. 3.82-5.14	4.30	3.82	5.14	4.16	4.16	4.37	4.17	4.25
Change from Fall to Winter		.52	.35	.55	.46	(.33)	.25	.97	1.39
Tests and Grades	Fall 3.18-4.50	3.87	3.34	4.32	3.63	4.50	4.25	3.84	3.18
(Questions 1-4-9-16-20-27)	Wtr. 3.52-4.62	4.08	3.52	4.62	4.28	3.97	4.12	4.10	3.97
Change from Fall to Winter		.21	.18	.30	.65	(.53)	(.13)	.26	.79
Subject Matter Knowledge	Fall 3.28-4.89	4.24	4.23	4.69	4.15	4.89	4.32	4.09	3.28
(Questions 5-8-12-18-24-26)	Wtr. 4.17-4.98	4.52	4.55	4.98	4.42	4.44	4.46	4.62	4.17
Change from Fall to Winter		.28	.32	.29	.27	(.45)	.14	.53	.89
Overall	Fall 3.45-4.70	4.11	3.78	4.70	3.95	4.67	4.39	3.85	3.45
(Averaging above Sub-Groups)	Wtr. 4.14-5.08	4.46	4.14	5.08	4.39	4.27	4.51	4.44	4.42
Change from Fall to Winter		.35	.36	.38	.44	(.40)	.12	.59	.97

with the Rating Scale (student evaluation) results from their previous course. Suggestions and strategies for improvement were then developed with each instructor for each low-rated item. The instrument and these procedures were apparently effective.

Individual instructor ratings on the Rating Scale and its sub-parts are summarized in Table 10 for each of the two quarters. With one major exception (Instructor IV), all of the GSI's increased their scores for almost all of the Rating Scale sub-parts. It is important to note that the only instructor whose ratings dropped (Instructor IV) developed mononucleosis during the experimental quarter and was the least active and enthusiastic participant in the training system. This illness and behavior undoubtedly carried over into his teaching performance. In testing, for example, he simply pulled old exams from his files. It is also interesting to note that Instructor V was an office mate with Instructor IV and used the same tests as did Instructor IV. Consequently, both instructors went down in their student ratings dealing with "tests and grades." Both the students and the Rating Scale instrument are apparently sensitive to such behavior and circumstances.

The student evaluations, as revealed by the Rating Scale, were also substantiated in early videotape reviews during the experimental quarter. Both the reviewer's observations and the actual videotape coding procedure revealed the same strengths and weaknesses as the student evaluations of GSI performances. High instructor ratings on "Personal Characteristics" and "Exposition" skills were supported by high coding frequencies on "Supportive" and "Receptive" categories of verbal and nonverbal expressions; high instructor ratings on "Subject Matter Knowledge" were supported by high coding frequencies on teaching methods other than "Lecture" and on higher level learning objectives such as "Complex Applications." The consistencies between these two instruments, along with the actual videotaped observations, were persuasive evidence in getting the GSI's to change their teaching behavior.

In summary, this study has confirmed that a systematic teacher training program involving Graduate Student Instructors of introductory economics with an integrated series of instructional seminars, student evaluations, and videotaped observations can have a significant and measurable impact on both student and instructor performance in the actual classroom. Specifically, it was found that as a result of the training system, (a) student performance, as measured by the TUCE, and (b) instructor ratings, as measured by the Purdue Rating Scale for College Instructors, both increased significantly. It was also found that instructor ratings, as measured

by student evaluations on the Rating Scale, associate highly with student performances on the TUCE.

The experimental efforts and the results of this study confirm that other institutions and departments similar to the Department of Economics at the University of Minnesota can and should undertake greater responsibilities for providing their graduate student instructors with teacher training.

4. Suggestions for Implementing the GSI Program

In this final section of the monograph, a number of additional suggestions are offered to any faculty (or student) group interested in beginning such a GSI teacher training program in their own department or school. A number of recommendations are made which are general in nature and not related to the teaching role which might be assigned to a GSI. However, suggestions are also offered as to how the training program could be adapted to a department which employs GSI's as section (discussion) leaders rather than as instructors responsible for a course.

Suggestions in General

Independent of the exact nature of any GSI's teaching role, there is at least one *sine qua non* for the successful implementation of a teacher training program: *It is essential that the sponsoring department commit itself to the program's success.*

Those attempting to introduce a GSI program should recognize that the sponsoring department will likely be motivated by two considerations. First, the department should consider the implementation of any such training program a further commitment to quality undergraduate instruction. Second, the department should consider the program a part of the graduate students' professional training.

During the formative stages of the program, the department chairman and those faculty members directly responsible for curriculum review, the graduate student program, and undergraduate instruction should review the program's design and offer criticism and suggestions. As the program is implemented, these department members should join the program staff and GSI trainees for at least one session to voice their support and expectations, and the department's purpose in supporting the program. Finally, when the training program has matured (perhaps after one or more years) the department should declare that participation in the GSI training program is a condition for employment as a graduate student instructor.

A second crucial element for successful implementation of the program is development of motivation and an appropriately positive attitude toward the training program on the part of the GSI's. As a first step in developing this attitude the program director should choose the seminar coordinator and reviewer/critiquer from among the graduate students respected by their peers as excellent teachers and economists. Although most GSI's are highly motivated to participate actively in the training program by their own desire to become good teachers, we suggest that the program director seek additional departmental support designed to appeal to the GSI's developing sense of professionalism. At the University of Minnesota, we have received departmental approval for the GSI training program to be considered as an economics graduate level course which can be formally recorded on the GSI's transcript. In addition, the department has supported efforts to provide GSI's with their "best" videotapes for their own professional use (e.g., as a vivid source of information on teaching performance and effectiveness which the GSI might decide to offer to a prospective employer).

Because of the importance of the GSI's attitude to the success of the training program, it is recommended that the GSI program staff be particularly careful to set a good example of teaching behavior in the sessions which they conduct. They should attempt to recognize the needs of the GSI's (e.g., nervousness before a first day in front of a class or the need to understand university or departmental rules). They should state goals for the program as a whole and objectives for each session, evaluate the participants on the basis of these goals and objectives, and engage in periodic evaluation of program effectiveness on the basis of these goals and objectives. They should demonstrate any good teaching techniques they recommend to the GSI's not only when the techniques are topical but also throughout the program. Staff members should also commit themselves to keeping to the announced agenda and schedule in order to impress upon the GSI's the importance of the agenda items.

It is also important to note that the GSI training program should *not* teach a particular style of instruction. Although we are convinced that good instruction proceeds according to the learning process model described in this paper, we do not suggest a specific set of objectives, traits, or techniques as being correct. Rather, we are convinced that each GSI should be encouraged to develop his or her own strengths and recognize his or her own weaknesses.

The low cost of the program described in this monograph is an additional recommendation for its adoption. Most of the develop-

mental costs have already been assumed in the creation of the instruments for evaluation and codification and the procedures for implementation. The initial purchase costs for the relatively maintenance-free video equipment totals approximately $3,000. At a larger university it might well be possible to rent video equipment from the university audio visual center or share equipment with another department—e.g., at the University of Minnesota all of the necessary videotaping for eight to ten GSI's each year is scheduled within one-and-one-half quarters. The only other direct departmental costs are the part-time salaries for two junior (graduate student) faculty and released time for one senior faculty.

Adapting the GSI Training Program to an Alternative Setting

Any GSI training program must, of course, be designed to help the GSI function in the teaching role assigned by the department. Because at the University of Minnesota the GSI's in economics serve as course *instructors* responsible for planning and implementing their own courses, the program described in this monograph has been planned to instruct participants in a broad range of teaching skills. At many universities, however, GSI's function as *section leaders*, coordinating discussion and problem-solving for a small group of students to whom a senior faculty person lectures in a large group format. These GSI's will find seminar sessions devoted to lecture skills, setting course goals, or planning examinations less relevant for their immediate use. In what follows, suggestions are made as to how one might adapt the GSI program to a department where GSI's serve only as section (discussion) leaders.

The seminar portion of the program affords a natural opportunity for the seminar coordinator to bring together the senior faculty responsible for lecturing and planning the course and the GSI section leaders. Thus, the seminar coordinator should endeavor to have the senior faculty person discuss with the GSI's the objectives for the large lectures and for the "section meetings." In this way the GSI's can gain some experience in setting objectives for their sections, can better coordinate their section sessions with the lecture sessions, and will have input into decision-making for the course which should motivate their own performance. It should be obvious that the seminar coordinator will be successful in this part of the sessions only with the full support of the senior faculty person(s), especially since the senior faculty person must be able

to state his or her objectives and be willing to accept some GSI input.

It is strongly recommended (and obvious) that crucial skills for the GSI section leader to develop are the abilities to engage students in applying principles presented in the lecture and to draw them out with questioning techniques. Students seldom participate (except as active listeners) in a large lecture session. Consequently, students will receive supervised practice in applying the concepts they are learning only via discussion in small groups, problem sets, and exams. In each of these cases, it will more likely be the GSI than the senior faculty person who interacts with the students. The seminar coordinator should devote at least 30 per cent of the total seminar time to developing GSI's discussion-leading and questioning skills. As discussed earlier in this monograph, microteaching sessions designed to reinforce probing techniques are particularly valuable teaching devices.

In spite of the focus on discussion techniques, the seminar coordinator should also demonstrate lecture techniques (particularly blackboard skills) since the GSI should be able to make a well-organized presentation during a class session devoted to exam or problem set review. However, if there is a necessary choice between a session in which someone lectures on blackboard technique and one in which the participants first learn some technique and then practice the technique in the group session, the latter approach is recommended.

If the GSI's will be sharing responsibilities for writing examinations, the seminar coordinator should devote at least one session to examination writing and evaluation skills. If possible, the seminar coordinator should time the seminar sequence so that participants can read and comment on one another's exam questions before they are due to submit exam questions to the senior faculty person.

Finally, it is as important for the GSI section leader as for the GSI lecturer to receive feedback on his or her classroom performance. The reviewer/critiquer should be sure that evaluation forms permit students to comment on and answer specific questions about their weekly section meetings. The reviewer/critiquer should take pains, however, to emphasize the developmental rather than the judgmental uses of evaluation results. The reviewer/critiquer should also arrange to videotape the GSI during section meetings. Because the GSI's role as section leader is different, the reviewer/critiquer will emphasize different things in the critique; in particular, how the GSI leads the class in discussion, draws them out with questioning techniques, and, in general, supervises their participation.

Appendix A:
Seminar Syllabus Outline

Fall, 1974

I. Meeting One

A. Introduction.
   1. Minnesota's participation in the American Economic Association/Joint Council of Economic Education project.
   2. Motivation for the project and for the participation of teaching associates in our department.
   3. How the teacher training program works.
   4. Establishing a seminar schedule.

B. Objectives and goals.
   1. By the conclusion of today's meeting, all participants should be able to demonstrate in discussion their willingness to participate actively in the program.
   2. By the conclusion of today's meeting all participants should feel less anxiety in anticipating their first day in class.

C. A model of education—how the learning process is accomplished.

D. Some data and questions in anticipation of first day needs.
   1. The needs of the principles students.
   2. Your needs as instructors.
   3. Some University resources and how they work.

E. A consideration of potential future topics.
   1. Discussion: "How should we use the seminar time to meet our needs?"
   2. Extrapolation: "How can we gauge the needs of our students?"

II. Meeting Two

A. Discovering the needs of students.

1. At what level should we teach the principles course?
2. Assumptions about the backgrounds of students.

B. Setting course goals.

C. Using behavioral objectives to reach goals.

D. How setting objectives makes testing and evaluation easier.

III. Meeting Three

A. Further discussion on implementing the objective-setting approach to class preparation.

1. Integrating the audiovisual program and the seminars.
2. Data collection.

B. Some notes on the importance of teaching skills.

C. Lecture skills.

IV. Meeting Four

A. Discussion of our objective-setting experiment and the use of the daily teaching checklist.

B. Lecturing skills.

1. Discussion of guest lecturer's comments at meeting three.
2. Lecturing and the use of advanced organizers.

C. The use of audiovisual tools in lecturing.

V. Meeting Five

A. How to write, give, and interpret effective examinations.

B. Discussion of questions and problems submitted by participants.

1. What should an instructor do when his class slows him up with trivial questions?
2. How should we grade our students? What are good rules for giving grades?
3. Does each section instructor have an obligation to grade alike?

VI. Meeting Six

A. Continuation of our idea exchange—specific techniques, problems, situations, and questions relevant to our teaching experience thus far.

B. What kinds of feedback do we as teachers get from our students?

1. What kinds of student feedback give us information useful in making midcourse corrections in our courses?
2. The use of student evaluations of instructors.

C. The art of stimulating student feedback by asking questions.

1. What is probing? How can probing shift the emphasis from instructor talk to student talk?
2. What are the kinds of probes? What is each kind of probing good for?
3. When should an instructor probe students?

VII. Meeting Seven

A. Analyzing the feedback we get from our students.

1. Test results.
2. Videotape.
3. Instructional evaluations.
4. Feedback via class dialogue.

B. A videotape example of probing.

VIII. Meeting Eight

One of the most difficult things about a discussion is starting it with a common experience or a controversy. Thus, all members of the group should bring to the seminar one "discussion starter" they have used successfully or think they might use successfully. In addition to beginning discussions, we will talk about:

A. The purpose of discussion.

B. How to get participation.

C. The instructor's role in discussion.

D. How to keep discussion from degenerating into arguments.

IX. Meeting Nine

Obtaining participants' feedback on the seminar portion of the Teacher Training Program and other unresolved issues.

Appendix B:

Categorical References

The following list, while not exhaustive, categorizes references which the authors have found to be helpful. The most useful have been starred and italicized.

Topics dealing with **instructional planning and design** (Davies 1973; Gagne and Briggs 1974) and the construction and use of **instructional objectives** (Ausubel 1960; Biehler 1974; Bloom 1968; **Gronlund 1970*; Kelley 1973; Krathwohl 1964; Mager 1962; Nelson 1970; Phillips 1972, 1974; Thompson 1970; Travers 1973) have an extensive and cumulative body of literature in the field of education. And, of course, the "general education" literature of higher education is very significant to the goals and objectives of any **introductory course** (Axelrod 1969; **Barzun 1970*; **Bell 1966*; Bruner 1963; Dressel 1968, 1969; Freedman 1967, Mayhew 1968; Postman and Weingartner 1969; Schwab 1969; Thomas 1960; Wormald 1964). More recently, a growing body of economic education literature has examined and reported on the goals, objectives and outcomes specific to the **principles course in economics** (Attiyeh and Lumsden 1972; **Bach 1965*, 1966, 1967; Bellico 1970; Clayton 1964; Crowley and Wilton 1974; Dawson and Bernstein 1967; Leamer 1950, 1965; Lewis 1970, 1973; Lewis and Dahl 1972; Moyer and Paden 1968, 1970; Paden and Moyer 1971, 1972; Saunders 1970, 1971; Saunders and Bach 1970; Siegfried and White 1973). Even the roles of and effects upon attitudes and values have been examined as outcomes of the **principles course** (Horton 1972; Jacob 1958; Karstensson and Vedder 1974; **Luker 1972*; Mann and Fusfeld 1970; Sloane 1972; Thompson 1973).

In addition to a number of excellent sources in the higher education literature dealing with **general tips for teacher training** (Allen 1968; Beard 1970; Bligh 1972; Eble 1970, 1971, 1972; Flournoy 1972; Hansen 1973; Highet 1954; Lee 1967; MIT 1974; **McKeachie 1969*; Miller 1972; Morris 1970; Nowles 1968; Pace 1973; Peterson 1946; Travers 1973), other references are directed to the specific skills and use of *lectures* (Beard 1970; Bligh 1972; Buckles and McMahon 1971; **McKeachie 1969*), the construction and use of **tests and measurements** in the classroom (Buckles and Welsh 1972; **Ebel 1962*; Fels 1967, 1970; Furst 1964; Gery 1972; **Gronlund 1968*, 1971; Isaac and Michael 1971; Lewis and Dahl 1971; Matten

1972; Psychological Corporation 1968; Rothman and Scott 1973; Sanders 1966; Welsh and Fels 1969; Whitney 1970; Wood 1961), **discussion techniques** and **interpersonal communication skills** (Greenberg 1969; Gregory 1972; Lyon 1971; *McKeachie 1969; Phillips 1966; Potter 1969), and the evaluation and use of **teaching assistants** as discussion leaders and teachers (Chase 1970; Lamphear and McConnell 1970; Lewis and Orvis 1973; Nowles 1968; Oates and Quandt 1970).

A significant number of articles have recently appeared in the economic education literature which give systematic review and evaluation to a host of other **special techniques**—i.e., games and simulations, programmed learning, audiovisual, computer assisted instruction, laboratories, etc.—which have been employed in the principles course (Attiyeh and Lumsden 1965; Ault and Rutman 1974; Bach 1969; Booms 1974; Brown and Finch 1973; Calkins 1970; Danielsen and Stauffer 1972; Dawson 1974; Dubbin and Taveggia 1968; Emery and Enger 1972; Gordon 1969; Fels and Starleaf 1963; Fusfeld and Jump 1966; Haley 1967; Hansen, Kelley, and Weisbrod 1970; Havrilesky 1971; Kelley 1968, 1972; Kourilsky 1972; Levin 1967; Lewis and Orvis 1971; Lloyd 1970; Lumsden 1967, 1970; Maurizi 1972; McConnell 1964, 1968; Meinkoth 1971; Muhkerjee and Loughlin 1971; Nelson 1959; Paden 1969, 1970; Porreca 1971; Ramsett, Johnson, and Adams 1973; Scriven 1965; Soper 1973; Staff 1972; Tiemann, Paden, and McIntyre 1966; Villard 1969; Widenaar 1972; Welsh 1972; Wentworth and Lewis 1973).

Appendix C:

Selected Bibliography

Allen, Rodney F., John V. Fleckenstein and Peter M. Lyon (eds.). *Inquiry in the Social Studies: Theory and Examples for Classroom Teachers.* Washington, D.C.: National Council for the Social Studies, 1968.

Allen, D. W. and K. Ryan. *Microteaching.* Reading, MA: Addison-Wesley, 1969.

Attiyeh, Richard and Keith Lumsden. "The Effectiveness of 'Programmed Learning' in Economics." *American Economic Review* 55 (May 1965): 549-555.

Attiyeh, Richard and Keith Lumsden. "Some Modern Myths in Teaching Economics: The U. K. Experience." *American Economic Review* 62 (May 1972): 429-433.

Ault, David and Gilbert Rutman. "Problem-Solving Laboratory as a Teaching Device in Economics: Some Tentative Conclusions." *Journal of Economic Education* 5 (Spring 1974): 129-132.

Ausubel, D. P. "Use of Advanced Organizers in the Learning and Retention of Meaningful Verbal Material." *Journal of Educational Psychology* 51 (1960): 267-272.

Axelrod, Joseph (ed.). *The Search for Relevance.* San Francisco : Jossey-Bass, 1969.

Bach, G. L. "A Further Note on Programmed Learning in Economics." *Journal of Economic Education* 1 (Fall 1969): 56-59.

Bach, G. L. "Student Learning in Basic Economics: An Evaluated Experimental Course." In *New Developments in the Teaching of Economics.* Edited by Keith Lumsden. Englewood Cliffs, N. J.: Prentice-Hall, 1967.

Bach, G. L. and Phillip Saunders. "Economic Education: Aspirations and Achievements." *American Economic Review* 55 (June 1965): 329-356.

Bach, G. L. and Phillip Saunders. "Lasting Effects of Economics Courses at Different Types of Institutions." *American Economic Review* 56 (June 1966): 505-511.

Barzun, Jacques. *The American University, How It Runs, Where It's Going.* New York: Harper and Row, 1970.

Beard, Ruth. *Teaching and Learning in Higher Education.* Baltimore: Penguin Books, 1970.

Becker, W. E. "The University Professor as A Utility Maximizer and Producer of Learning, Research and Income." *Journal of Human Resources* (Winter 1975): 107-115.

Bell, Daniel. *The Reforming of General Education.* New York: Columbia University Press, 1966.

Bellico, Russell P. "The Relationship of Selected Factors to Academic Achievements in Economics." Doctoral dissertation, University of Massachusetts, 1970.

Biehler, R. F. *Psychology Applied to Teaching.* Boston: Houghton Mifflin Company, 1974.

Bligh, Donald A. *What's the Use of Lectures?* Baltimore: Penguin Books, 1972.

Bloom, B. S. *Learning for Mastery: Evaluation Comment.* Los Angeles: Center for the Study of Evaluation of Instructional Programs, University of California, 1968.

Booms, Bernard H. and D. Lynne Kaltreider. "Computer-Aided Instruction for Large Elementary Courses." *American Economic Review* 64 (May 1974): 408-413.

Brown, Byron and John Finch. "A Self-Motivating Technique for the Teaching of Economics in the Small State College and/or Community College Environment." *Community College Social Science Quarterly* 4 (February 1973): 40-44.

Bruner, Jerome. *The Process of Education.* Vintage, 1963.

Buckles, Stephen G. and Marshall E. McMahon. "Further Evidence on the Value of Lectures in Elementary Economics." *Journal of Economic Education* 2 (Spring 1971): 138-141.

Buckles, Stephen G. and Arthur L. Welsh. "The Use of Validated Tests in Teaching and Research." In *Research Papers in Economic Education,* pp. 24-33. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Calkins, Ralph N. "A Computerized Model of Exchange as an Aid to Teaching Price Theory." *Journal of Economic Education* 1 (Spring 1970): 97-103.

Capozza, Dennis R. "Student Evaluations, Grades and Learning in Economics." *Western Economic Journal* 11 (March 1973): 127.

Chase, John L. *Graduate Teaching Assistants in American Universities: A Review of Recent Trends and Recommendations.* Washington, D.C.: U.S. Office of Education, 1970.

Cohen, Stanley H. and Wallace G. Berger. "Dimensions of Students' Ratings of College Instructors Underlying Subsequent Achievement on Course Examinations." *Proceedings, 78th Annual Convention, American Psychological Association* 5 (1970): 605-606.

Clayton, Rennie E. "Performance in Economics at Schools and Universities." *Vestes* (Federal Council of University Staff Associations of Australia) 7 (June 1964).

Costin, F., W. T. Greenough and R. J. Menges. "Student Ratings of College Teaching: Reliability, Validity, and Usefulness." *Review of Educational Research* 41 (December 1971): 511-535.

Crowley, Ron W. and D. A. Wilton. "A Preliminary Investigation of the Efficiency of Introductory Economics Courses." *Journal of Economic Education* 5 (Spring 1974): 103-108.

Danielsen, Albert L. and A. J. Stauffer. "A Television Experiment in College Economics." *Journal of Economic Education* 3 (Spring 1972): 101-105.

Davies, I. K. *Competency Based Learning: Technology, Management, and Design.* New York: McGraw-Hill, 1973.

Dawson, George and Irving Bernstein. *The Effectiveness of Introductory Economics Courses in High Schools and Colleges.* New York: Center for Economic Education, New York University, 1967.

Dawson, George G. (ed.). *Economic Education Experiences of Enterprising Teachers.* New York: Joint Council on Economic Education, Annually.

Dressel, Paul L. *College and University Curriculum.* Berkeley: McCutchan, 1968.

Dressel, Paul L. and Frances DeLisle. *Undergraduate Curriculum Trends.* Washington, D. C.: American Council on Education, 1969.

Dubbin, Robert and Thomas C. Taveggia. *The Teaching-Learning Paradox: A Comparative Analysis of College Teaching Methods.* Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1968.

Ebel, Robert L. *Measuring Educational Achievement.* Englewood Cliffs, N.J.: Prentice-Hall, 1962.

Eble, K. E. *Career Development of the Effective College Teacher.* Washington, D.C.: American Association of University Professors and Association of American Colleges, 1971.

Eble, K. E. *Professors as Teachers.* San Francisco: Josey-Bass, 1972.

Eble, K. E. *The Recognition and Evaluation of Teaching.* Washington, D.C.: American Association of University Professors and Association of American Colleges, 1970.

Emery, E. David and Thomas P. Enger. "Computer Gaming and Learning

in an Introductory Economics Course." *The Journal of Economic Education* 3 (Spring 1972): 77-85.

Fels, R. "On Teaching Elementary Economics." *American Economic Review* 44 (December 1955): 919-932.

Fels, Rendigs and Dennis R. Starleaf. "Controlled Experiments in Teaching Techniques." *Southern Economic Journal* 30 (July 1963): 68-73.

Fels, Rendigs. "A New 'Test of Understanding in College Economics.'" *American Economic Review* 57 (May 1967): 660-666.

Fels, Rendigs. "Hard Research on a Soft Subject: Hypothesis-Testing in Economic Education." *Southern Economic Journal* 36 (July 1969): 1-9.

Fels, Rendigs. "Multiple Choice Questions in Elementary Economics." In *Recent Research in Economic Education*. Edited by Keith Lumsden. Englewood Cliffs, N.J.: Prentice-Hall, 1970.

Flournoy, Don M. *The New Teachers*. San Francisco: Jossey-Bass, 1972.

Freedman, Mervin B. *The College Experience*. San Francisco: Jossey-Bass, 1967.

Furst, Edward J. *Constructing Evaluation Instruments*. New York: David McKay, 1964.

Fusfeld, Daniel R. and Gregory Jump. "An Experiment with Programmed Instruction in Economics." *Southern Economic Journal* 33 (January 1966): 353-356.

Gagne, R. M. and L. J. Briggs. *Principles of Instructional Design*. New York: Holt, Rinehart and Winston, 1974.

Gery, Frank W. "Does Mathematics Matter?" In *Research Papers in Economic Education*, pp. 142-157. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Gery, Frank W. "Mathematics and the Understanding of Economic Concepts." *Journal of Economic Education* 2 (Fall, 1970): 100-104.

Gery, Frank W. "Is There a Ceiling Effect to the Test of Understanding in College Economics?" In *Research Papers in Economic Education*, pp. 34-49. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Gordon, Sanford. "Optimizing the Use of Televised Instruction." *Journal of Economic Education* 1 (Fall 1969): 46-50.

Greenberg, H. M. *Teaching with Feeling, Compassion and Self-Awareness in the Classroom Today*. New York: Macmillan, 1969.

Gregory, T. *Encounters with Teaching: A Microteaching Manual*. New York: Prentice-Hall, 1972.

Gronlund, Norman E. *Constructing Achievement Tests*. Englewood Cliffs, N.J.: Prentice-Hall, 1968.

Gronlund, Norman E. *Measurement and Evaluation in Teaching*. New York: Macmillan, 1971.

Gronlund, Norman E. *Stating Behavioral Objectives for Classroom Instruction*. New York: Macmillan, 1970.

Haley, Bernard F. *Experiments in the Teaching of Basic Economics*. New York: Joint Council on Economic Education, 1967.

Hansen, W. Lee, Allen C. Kelley and Burton A. Weisbrod. "Economic Efficiency and the Distribution of Benefits from College Instruction." *American Economic Review* 60 (May 1970): 364-369.

Hansen, W. Lee and Allen C. Kelley. "Political Economy of Course Evaluations." *Journal of Economic Education* 5 (Fall 1973): 10-21.

Hansen, W. Lee. "Readings on Effective Teaching." *Journal of Economic Education* 5 (Fall 1973): 63-67.

Havrilesky, Thomas. "A Test of the Effectiveness of Teaching Money and Banking by Programmed Instruction." *Journal of Economic Education* 2 (Spring 1971): 151-154.

Heller, H. Robert. "The Effectiveness of the Principles of Economics Course." *Business Education Forum* 25 (May 1971): 47-49.

Highet, Gilbert. *The Art of Teaching*. New York: Modern Library, 1954.

Horton, R. B. "Values and the Economics Principles Course." *Journal of Economic Education* 3 (Spring 1972): 118-123.

Isaac, Stephen and William B. Michael. *Handbook in Research and Evaluation.* San Diego: Robert R. Knapp, 1971.

Jacob, Philip E. *Changing Values in College: An Exploratory Study of the Impact of College Teaching.* New York: Harper, 1958.

Karstensson, Lewis and R. K. Vedder. "A Note on Attitude as a Factor in Learning Economics." *Journal of Economic Education* 5 (Spring 1974): 109-111.

Kelley, Allen C. "*An Experiment with TIPS: A Computer-Aided Instructional System for Undergraduate Education.*" *American Economic Review* 58 (May 1968): 446-491.

Kelley, Allen C. "Individualizing Instruction Through the Use of Technology in Higher Education." *Journal of Economic Education* 4 (Spring 1973): 77-89.

Kelley, Allen C. "TIPS and Technical Change in Classroom Instruction." *American Economic Review* 62 (May 1972): 422-428.

Kelley, Allen C. "Uses and Abuses of Course Evaluations as Measures of Educational Output." *Journal of Economic Education* 4 (Fall 1972): 13-18.

Key, Charles M. "Evaluation of Knowledges and Understandings Acquired by Students in Collegiate Elementary Economics Apposite to a Selected Problem." Doctoral dissertation, Indiana University, 1969.

Klos, Joseph J. and R. W. Trenton. "One Semester or Two." *Journal of Economic Education* 1 (Fall 1969): 51-55.

Kourilsky, Marilyn. "Learning through Advocacy: An Experimental Evaluation of an Adversary Instructional Model." *Journal of Economic Education* 3 (Spring 1972): 86-92.

Krathwohl, D. R., Bloom, B. S. and Masia, B. B. *Taxonomy of Educational Objectives. Handbook II: Affective Domain.* New York: McKay, 1964.

Lamphear, Charles and Campbell R. McConnell. "A Note on the Use of Graduate Teaching Assistants in the Principles Course." *Journal of Economic Education* 1 (Spring 1970): 139-142.

Leamer, Laurence G. "A Brief History of Economics in General Education." *American Economic Review* 40 (December 1950): 18-33.

Leamer, Laurence. *The Economist as Teacher: Informal Essays on the Collegiate Teaching of Economics.* Chicago: South-Western Publishing, 1965.

Lee, Calvin T. (ed.). *Improving College Teaching.* Washington, D.C.: American Council on Education, 1967.

Levin, Harry M. "Differences in Outcomes between Large and Small Classes in Western Civilization and Economics." Doctoral dissertation, Rutgers University, 1967.

Lewis, Ben W. "A Retrospective Look at Undergraduate Economics." *American Economic Review* 60 (1970): 370-375.

Lewis, Darrell R. and Tor Dahl. "The Test of Understanding in College Economics and its Construct Validity." *Journal of Economic Education* 2 (Spring 1971): 155-166.

Lewis, Darrell R. and Tor Dahl. "Critical Thinking Skills in the Principles Course: An Experiment." In *Research Papers in Economic Education,* pp. 50-69. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Lewis, Darrell R. and Tor Dahl. "Factors Influencing Performance in the Principles Course Revisited." In *Research Papers in Economic Education,* pp. 94-117. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Lewis, Darrell R., Donald R. Wentworth and Charles C. Orvis. "Economics in the Junior Colleges: Terminal or Transfer?" *Journal of Economic Education* 4 (Spring 1973): 100-110.

Lewis, Darrell R. and Charles C. Orvis. *Research in Economic Education.* New York: Joint Council on Economic Education, 1971.

Lewis, Darrell R. and Charles C. Orvis. "A Training System for Graduate Student Instructors of Introductory Economics at the University of

Minnesota." *Journal of Economic Education* 5 (Fall 1973): 38-46.

Lloyd, John W. "Role Playing, Collective Bargaining, and the Measurement of Attitude Change." *Journal of Economic Education* 1 (Spring 1970): 104-110.

Luker, William A. "The Relationship between Economic Knowledge and Certain Elements of the Affective Domain." In *Research Papers in Economic Education*, pp. 12-23. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Lumsden, Keith. "The Effectiveness of Programmed Learning in Elementary Economics." *American Economic Review* 57 (May 1967): 652-659.

Lumsden, Keith G. (ed.). *New Developments in the Teaching of Economics*. Englewood Cliffs, N.J.: Prentice-Hall, 1967.

Lumsden, Keith. "On Crossing the 'Pons Asinorum.'" In *Recent Research in Economics Education*. Edited by Keith Lumsden. Englewood Cliffs, N.J.: Prentice-Hall, 1970.

Lumsden, Keith G. "Summary of an Analysis of Student Evaluations of Faculty and Courses." *Journal of Economic Education* 5 (Fall 1973): 54-56.

Lyon, D. Jr. *Learning to Feel—Feeling to Learn*. Columbus, Ohio: Charles E. Merrill Publishing, 1971.

Mager, Robert F. *Preparing Instructional Objectives*. Palo Alto, Calif.: Fearon Publishers, 1962.

Mann, William R. and Daniel R. Fusfeld. "Attitude of Sophistication and Effective Teaching in Economics." *Journal of Economic Education* 1 (Spring 1970): 111-129.

Massachusetts Institute of Technology, Faculty Committee. *You and Your Students*. Cambridge, Mass.: Director of Admissions, Massachusetts Institute of Technology, 1974.

Matten, A. E. "Multiple Choice in Advanced Level Economics." *Economics: The Journal of the Economics Association* 9 (Autumn 1972): 285-294.

Maurizi, Alex. "Programmed Learning and the Retention of Knowledge." In *Research Papers in Economic Education*, pp. 134-141. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Mayhew, Lewis W. *Colleges Today and Tomorrow*. San Francisco: Jossey-Bass, 1968.

McConnell, Campbell R. "An Experiment with Television in the Elementary Course." *American Economic Review* 58 (May 1968): 469-482.

McConnell, Campbell R. and John R. Felton. "A Controlled Evaluation of 'The American Economy.'" *American Economic Review* 54 (June 1964): 403-407.

McConnell, Campbell R. and Charles Lamphear. "Teaching Principles of Economics without Lectures." *Journal of Economic Education* 1 (Fall 1969): 20-32.

McKeachie, Wilbert J. *Teaching Tips: A Guidebook for the Beginning College Teacher*. Boston: D. C. Heath, 1969.

Meinkoth, Marian R. "Textbooks and the Teaching of Economic Principles." *Journal of Economic Education* 2 (Spring 1971): 127-130.

Miller, R. *Evaluating Faculty Performance*. San Francisco: Jossey-Bass, 1972.

Mirus, Rolf. "Some Implications of Student Evaluation of Teachers." *Journal of Economic Education* 3 (Fall 1973): 35-37.

Morris, William H. (ed.). *Effective College Teaching*. Washington, D.C.: American Association for Higher Education, 1970.

Moyer, M. Eugene and Donald W. Paden. "Economics Achievement and Mathematics Training." *Journal of Economic Education* 2 (Fall 1970): 104-106.

Moyer, M. Eugene and Donald W. Paden. "On the Efficiency of the High School Economics Course." *American Economic Review* 58 (September 1968): 870-877.

Muhkerjee, Tridib and William M. Laughlin, Jr. "Computer Related Instruction." *Collegiate News and Views* 25 (Winter 1971): 3-6.

Nelson, Dennis L. "The Effect of Specifically Stated Instructional Objec-

tives on the Achievement of Collegiate Undergraduate Economics Students." Doctoral dissertation, University of Minnesota, 1970.
Nelson, Wallace B. "An Experiment with Class Size in the Teaching of Elementary Economics." *Educational Record* 40 (October 1959): 330-340.
Nichols, Alan and John C. Soper. "Economic Man in the Classroom." *Journal of Political Economy* 80 (September/October 1972): 1069-1073.
Nowles, Vincent, *et al.* *The Graduate Student Teacher.* Washington, D.C.: American Council on Education, 1968.
Oates, Wallace D. and Richard E. Quandt. "The Effectiveness of Graduate Students as Teachers of the Principles of Economics." *Journal of Economic Education* 1 (Spring 1970): 131-138.
Pace, Robert C. (ed.). *Evaluating Learning and Teaching.* San Francisco: Jossey-Bass, 1973.
Paden, Donald W. "Television as a Means for Research in Teaching Techniques." In *New Developments in the Teaching of Economics.* Edited by Keith Lumsden. Englewood Cliffs, N.J.: Prentice-Hall, 1970.
Paden, Donald W. and M. Eugene Moyer. "The Relative Effectiveness of Three Methods of Teaching Principles of Economics." *Journal of Economic Education* 1 (Fall 1969): 33-45.
Paden, Donald W. and M. Eugene Moyer. "Some Evidence on the Appropriate Length of the Principles of Economics Course." *Journal of Economic Education* 2 (Spring 1971): 131-137.
Paden, Donald W. and M. Eugene Moyer. "The Teaching of the First Course in Economics." In *Research Papers in Economic Education,* pp. 84-93. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.
Peterson, H. *Great Teachers.* New York: Modern Library, 1946.
Phillips, Gerald. *Communication and Small Groups.* Indianapolis: Bobbs-Merrill, 1966.
Phillips, James A. "Instructional Objectives and Economic Understanding." *Journal of Economic Education* 3 (Spring 1972): 112-117.
Phillips, James A. "Instructional Objectives in Community College Economic Education." *Journal of Economic Education* 5 (Spring 1974): 116-118.
Porreca, Anthony Gabriel. "A Comparison of the Effectiveness of an Overhead Projector Presentation and a Programmed Textbook Presentation in Economic Education." Doctoral dissertation, Boston University, 1971.
Postman, Neil and Charles Weingartner. *Teaching as a Subversive Activity.* New York: Delacorte Press, 1969.
Potter, David. *Discussion: A Guide to Effective Practice.* Belmont, California: Wadsworth, 1969.
Psychological Corporation. *Test of Understanding in College Economics. Manual.* New York: Psychological Corporation, 1968.
Ramsett, David E., Jerry D. Johnson and Curtis Adams. "Some Evidence on the Value of Instructors in Teaching Economic Principles." *Journal of Economic Education* 5 (Fall 1973): 57-62.
Remmers, H. H. and J. A. Weisbrod. *Manual of Instructions for the Purdue Rating Scale for Instructors.* West Lafayette, Ind.: Purdue University Bookstore, 1965.
Rodin, Miriam and Burton Rodin. "Student Evaluation of Teachers." *Science* 177 (September 1972): 1164-1166.
Rothman, Mitchell P. and James H. Scott, Jr. "Political Opinions and the TUCE." *Journal of Economic Education* 4 (Spring 1973): 118-124.
Salemi, Michael K. and William E. Becker. "A Training System for Graduate Student Instructors of Introductory Economics." Videotape, University Media Resources, University of Minnesota, 1974.
Sanders, Norris M. *Classroom Questions—What Kinds?* New York: Harper and Row, 1966.
Saunders, Phillip. "Does High School Economics Have a Lasting Impact?" *Journal of Economic Education* 2 (Fall 1970): 39-55.
Saunders, Phillip. "The Lasting Effects of Elementary Economics Courses:

Some Preliminary Results." *American Economic Review* 61 (May 1971): 242-248.

Saunders, Phillip. "Student Learning and Instructor Ratings: The Carnegie-Mellon Experience in Introductory Economics." In *Research Papers in Economic Education*, pp. 2-11. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Saunders, Phillip and G. L. Bach. "The Lasting Effects of an Introductory Economics Course: An Exploratory Study." *Journal of Economic Education* 1 (Spring 1970): 143-149.

Schwab, Charles. *College Curriculum and Student Protest.* Chicago: University of Chicago Press, 1969.

Scriven, Donald D. "Economic Education: Identical Methods and Materials for Secondary and Collegiate Students with Comparisons of Student Performances." Doctoral dissertation, State University of Iowa, 1965.

Siegfried, John J. and Kenneth J. White. "Teaching and Publishing as Determinants of Academic Salaries." *Journal of Economic Education* 4 (Spring 1973): 90-99.

Sloane, Peter E. "The Relationship of Performance to Instruction and Student Attitudes." In *Research Papers in Economic Education*, pp. 70-83. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Soper, John C. "Soft Research on a Hard Subject: Student Evaluations Reconsidered." *Journal of Economic Education* 3 (Fall 1974): 22-26.

Soper, John C. "Programmed Instruction in Large-Lecture Courses." *Journal of Economic Education* 4 (Spring 1973): 125-129.

Staaf, Robert J. "Student Performance and Changes in Learning Technology in Required Courses." *Journal of Economic Education* 3 (Spring 1972): 124-219.

Thomas, Russell. *The Search for a Common Learning. General Education. 1800-1960.* New York: McGraw-Hill, 1960.

Thompson, Fred A. "The Interaction of Cognition and Affect: The Issue of Free Trade." *Journal of Economic Education* 4 (Spring 1973): 111-117.

Thompson, Fred A. "Problems and Prospects of Economics Education in Community Junior Colleges." *Journal of Economic Education* 2 (Fall 1970): 31-38.

Tiemann, Philip W., Donald W. Paden and Charles J. McIntyre. *An Application of the Principles of Programmed Instruction to a Televised Course in College Economics.* Washington, D.C.: U.S. Department of Health, Education and Welfare, 1966.

Travers, Robert M. (ed.). *Second Handbook of Research on Teaching.* Chicago: Rand McNally, 1973.

Villard, Henry H. "Some Reflections on Student Evaluation of Teaching." *Journal of Economic Education* 5 (Fall 1973): 47-50.

Weidenaar, Dennis J. "The Effect of Programmed Instructional Materials and Other Factors on Performance in the Introductory Economics Course." In *Research Papers in Economic Education*, pp. 118-133. Edited by A. Welsh. New York: Joint Council on Economic Education, 1972.

Welsh, Arthur L. (ed.). *Research Papers in Economic Education.* New York: Joint Council on Economic Education, 1972.

Welsh, Arthur L. and Rendigs Fels. "Performance on the New Test of Understanding in College Economics." *American Economic Review* 59 (May 1969): 224-229.

Wentworth, Donald R. and Darrell R. Lewis. "An Evaluation of a Simulation Game for Teaching Introductory Economics in Junior Colleges." *Journal of Experimental Education* 42 (Winter 1973): 87-96.

Whitney, Simon N. "Measuring the Success of the Elementary Course." *American Economic Review* 50 (March 1960): 159-169.

Wood, Dorothy Atkins. *Test Construction: Development and Interpretation of Achievement Tests.* Columbus, Ohio: Charles E. Merrill Books, 1961.

Wormald, F. L. (ed). *Reflections on the Role of Liberal Education.* Washington, D.C.: Association of American Colleges, 1964.

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